

MILITARY SPECIFICATION

CONNECTORS, GENERAL PURPOSE, ELECTRICAL,
MINIATURE, CIRCULAR, ENVIRONMENT RESISTING,
GENERAL SPECIFICATION FOR

INACTIVE FOR NEW EQUIPMENT DESIGN AFTER DATE OF THIS SPECIFICATION,
USE MIL-C-83723, SERIES 3

1. SCOPE

1.1 Scope. This specification covers an environment-resisting family of miniature, circular, electrical connectors (plugs and receptacles), designed to meet the requirements of advanced aircraft, rockets, missiles, and space vehicles.

1.2 The physical characteristics for connectors include a series of plugs and receptacles in which the socket contact inserts have a resilient face, and the mating pin inserts may have either a resilient or a hard face. The available forms are as shown below:

- (a) Coupling types - Threaded (type T) and bayonet (type B).
- (b) Nine shell sizes - (8, 10, 12, 14, 16, 18, 20, 22 and 24).
- (c) Various contact arrangements and sizes, including low frequency shielded contacts (figure 1 of supplement 1).
- (d) Six different shell polarization positions
- (e) Six classes - Environment resisting (class R), hermetic (class H), stainless steel (class E), fluid resisting (class F), grounding (class G), firewall (class K).
- (f) Contact styles - "P" pin, "S" socket, "C" pin solder cup, "E" pin solder eyelet (styles C and E only for hermetic).

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

- QQ-A-200/8 - Aluminum Alloy Bar, Rod, Shapes, Tube and Wire, Extruded, and Structural, Shapes, 6061.
- QQ-A-225/10 - Aluminum Alloy Bar, Rod, and Wire, Rolled, Drawn, or Cold Finished, 6262.
- QQ-A-367 - Aluminum Alloy Forgings.
- QQ-P-35 - Passivation Treatments for Austenitic, Ferritic, and Martensitic Corrosion-resisting Steel (fastening devices).
- QQ-S-763 - Steel Bars, Shapes, and Forgings-Corrosion Resisting.
- L-P-378 - Plastic Sheet and Strip (Polyolefin).
- PPP-B-566 - Boxes, Folding, Paperboard.
- PPP-B-585 - Boxes, Wood, Wirebound.
- PPP-B-591 - Boxes, Shipping, Fiberboard, Wood-cleated.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood
- PPP-B-621 - Boxes, Wood, Nailed and Lock-corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-B-676 - Boxes, Setup.

MILITARY

- MIL-M-14 - Molding Plastics and Molded Plastic Parts, Thermosetting.
- MIL-P-116 - Preservation, Methods of.
- MIL-H-5606 - Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance.
- MIL-T-5624 - Turbine Fuel, Aviation Grades JP-4 and JP-5.
- MIL-S-7742 - Screw Threads, Standard, Optimum Selected Series: General Specification for.
- MIL-L-7808 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base.
- MIL-A-8625 - Anodic Coatings, for Aluminum and Aluminum Alloys.
- MIL-W-8777 - Wire, Electrical, Silicone-insulated, Copper, 600-volt, 200°C.
- MIL-L-8937 - Lubricant, Solid Film, Heat Cured.
- MIL-L-10547 - Liners, Case, and Sheet, Overwrap, Water-vaporproof or Waterproof, Flexible.
- MIL-W-16878 - Wire, Electrical, Insulated, High Temperature.
- MIL-I-17214 - Indicator, Permeability Low-Mu (GO-NO-GO).
- MIL-W-22759 - Wire, Electric, Fluorocarbon-Insulated-Copper or Copper Alloy.
- MIL-L-23699 - Lubricating Oil, Aircraft Turbine Engines, Synthetic Base.
- MIL-W-25038 - Wire, Electrical, High Temperature and Fire Resistant, Aircraft.
- MIL-C-26636 - Contacts, Crimp Type, For Electrical Connectors.
- MIL-L-27502 - Lubricating Oil, Aircraft Turbine Engine, Ester Base.
- MIL-C-45662 - Calibration System Requirements.
- MIL-C-55330 - Connectors, Preparation for Delivery of.

STANDARDS

FEDERAL

- FED-STD-406 - Plastics: Methods of Testing

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
- MIL-STD-454 - Standard General Requirements for Electronic Equipment.
- MIL-STD-1344 - Test Methods for Electrical Connectors.
- MS24254 - Contact-Electrical Connector, Male, Removable.
- MS24255 - Contact-Electrical Connector, Female, Removable.
- MS25471 - Wire, Electrical - Silicone - Insulated, Copper, 600 volt, 200°C Polyester Jacket
- MS27034 - Connector, Receptacle, Electrical, Pin Insert, Cylindrical, Miniature, Hermetic, Solder Mount.
- MS27184 - Contact - Electrical Connector, Pin, Coaxial Removable.
- MS27185 - Contact - Electrical Connector, Socket, Coaxial, Removable.
- MS27186 - Plug, End, Seal, Electrical Connector Size 16, 20, and 50 ohm coaxial.
- MS27187 - Plug, End, Seal, Electrical Connector Size 12, 16, and 22.
- MS27290 - Bushing, Cable Adapter.
- MS27291 - Support, Cable, Electrical Connector.
- MS27292 - Cap, Electrical Connector Plug, Protective, Metal, Threaded Coupling.
- MS27293 - Cap, Electrical Connector Plug, Protective, Metal, Bayonet Coupling.
- MS27294 - Cap, Electrical Connector, Receptacle, Protective, Metal, Threaded Coupling
- MS27295 - Cap Electrical Connector, Receptacle, Protective, Metal, Bayonet Coupling.
- MS27296 - Connector, Receptacle, Electrical, Dummy Stowage, Threaded Coupling.
- MS27297 - Connector, Receptacle, Electrical, Dummy Stowage, Bayonet Coupling.
- MS27426 - Tool Kit, Contact, Crimp Type, Electrical Connector.
- MS27557 - Adapter, Conduit, Right Angle.
- MS27558 - Support, Cable, Right Angle, Closed.
- MS27559 - Support, Cable, Right Angle.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

3. REQUIREMENTS

3.1 Military standards. The individual item requirements shall be as specified herein and in accordance with the applicable military standards.

3.1.2 In the event of conflict between this specification and the military standards listed on the supplement, the latter shall govern. In the event of conflict between this specification and the applicable document (section 2), the requirements of this specification shall govern.

3.2 Qualification. Connectors furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for the opening of the bids (see 4.4 and 6.3).

3.3 Materials. Materials shall be as specified hereinafter, however, when a definite material is not specified, a material shall be used which will enable the connectors to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty for acceptance of the finished product.

3.3.1 Finish. Aluminum parts other than class G connectors shall be anodic coated and sealed per MIL-S-8625 to meet the performance requirements herein. The resulting finish shall be dark gray to black in color. The finish of hermetic receptacles shall be suitable for soldering or brazing to the mounting surface. The finish on class G connectors shall be such as to provide an electrically conductive path from the cable clamp screws on the plug to the receptacle mounting flange and shall meet the other requirements herein. Classes E and K stainless steel, shall be passivated in accordance with QQ-P-35.

3.3.2 Dissimilar metals. Unless otherwise protected against electrolytic corrosion, dissimilar metals shall not be employed in intimate contact with each other in a connector or in any mated pairs of connectors conforming to this specification. Dissimilar metals are defined in MIL-STD-454, requirement 16.

3.3.3 Arc resistance (except class H). The resistance to arc of insert material disc specimens shall be a minimum of 115 seconds when tested in accordance with FED-STD-406, test method 4011. The circuit shall be as shown in figure 1. Details and exceptions are as follows:

- (a) A transformer of 12 kV. minimum voltage shall be used.
- (b) The kVA rating of the transformer is not specified, but 10 milliamperes (rms) shall be obtainable.
- (c) Sufficient external resistance may be added in the leg of the circuit that is not grounded, if necessary, to obtain the required 10 milliamperes across the electrodes in air (not reading on test specimens)
- (d) The cable on the resistance side shall be supported in air.
- (e) The floor of chamber shall have a 1-inch thick insulating sheet for support of the specimen under test.
- (f) A milliammeter shall be placed in the circuit between the ground and the arc electrodes.

- (g) The specimens shall be cleaned with a clean cloth dampened with alcohol and dried with a soft clean dry cloth before each test.
- (h) The arc electrodes shall be cleaned with a soft clean cloth dampened with alcohol and dried with a soft clean dry cloth before each test.
- (i) The primary voltage shall be controlled with a variable tap auto transformer.
- (j) Relative humidity shall be between 30 and 40 percent.
- (k) The interrupter shall cause an arc to flow 1/4 second and cease 1-3/4 seconds repeatedly during the first minute and to flow 1/4 second and cease 3/4 seconds repeatedly during the second minute.
- (l) The electrodes shall consist of two steel rods, 0.168 inch in diameter, equipped with tungsten wire tips, 0.060 inch in diameter, which have conical points with a 60° included angle. The electrodes shall be mounted to an insulated block at 45° to the vertical plane and shall be adjusted to give a 0.320-inch gap. Both electrodes shall be in the same horizontal and vertical planes.

3.4 Design, construction, and physical dimensions. Connectors shall be of the design, construction, and physical dimensions specified (see 3.1). Connectors shall be so designed that neither the pins nor the sockets will be damaged during normal mating of counterpart connectors. Each complete plug or receptacle is an assembly of specific parts, such as:

- (a) Body, comprising the shell, dielectric inserts, and on plugs, the coupling ring.
- (b) Contacts, pin or socket type as specified.
- (c) Plug end seal (except on hermetically sealed receptacles).
- (d) Cap, protective plastic.
- (e) Instruction sheet (except for class H).

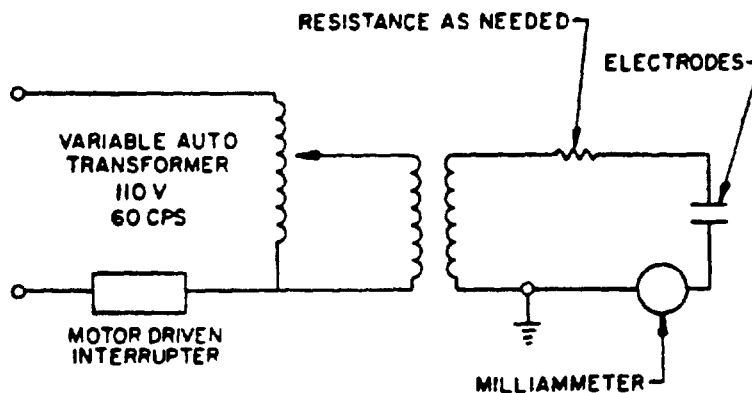


FIGURE 1 Arc-resistance test circuit

3.4.1 Body. The design and construction of the body portion of the plug and receptacle shall be as follows.

3.4.1.1 Shell.

3.4.1.1.1 Shell material. The shell for the plug or receptacle for classes R, F, and G shall be aluminum alloy 6061, temper T6, in accordance with QQ-A-367, QQ-A-200/8, alloy 6061, temper T6, or QQ-A-225/10, alloy 6262, temper T6. Other materials for classes R, F, and G will be permitted provided they show equal or better mechanical strength and meet the performance requirements herein. Shell material for class E shall be 300 series stainless steel. All materials shall be corrosion resistant or protected to meet the performance requirements herein. The shell material for the hermetic receptacles shall be suitable for soldering or brazing to a mounting surface of steel or aluminum alloy.

3.4.1.1.2 Shell keying. The polarization of the mating plug and receptacles shall be accomplished by integral keys and keyways on plug and receptacle shells, as shown on the applicable military standard. Keys shall be designed to prevent engagement of the contacts with the mating contacts or with the insert surface of the counterpart connector until the keyways are properly aligned for engagement.

3.4.1.1.3 Mating shells. The shells and their resilient inserts shall be designed to achieve a face-to-face resilient seal, as defined by applicable military standard drawings. Figure 2 shows typical mating characteristics for type T connectors. The seals thus provided shall be sufficient to allow engaged connectors to comply with the performance requirements specified herein. Complete mating of threaded types shall occur when the plug shell bottoms against the receptacle shell.

3.4.1.1.4 Receptacle shell. The single-hole mount receptacle shall be provided with an O-ring panel seal and nut with provisions for locking.

3.4.1.1.5 Coupling connection. The coupling ring of threaded and bayonet types shall be straight knurled or fluted and designed to assist in mating and unmating contacts as the coupling ring is tightened or loosened. It shall be possible to fully mate or unmate a counterpart plug and receptacle of any size and contact arrangement without the use of tools. The coupling ring shall be mechanically retained on the plug shell and shall provide positive retention of the plug and receptacle by solid shoulders on the coupling ring and plug shell. A plug with a bayonet coupling shall couple to its mating receptacle by rotating the coupling ring through 120° maximum as shown on the applicable military standard. The threaded coupling ring shall have three 0.035 diameter safety wire holes equally spaced.

3.4.1.1.6 Visual indicator of completed coupling.

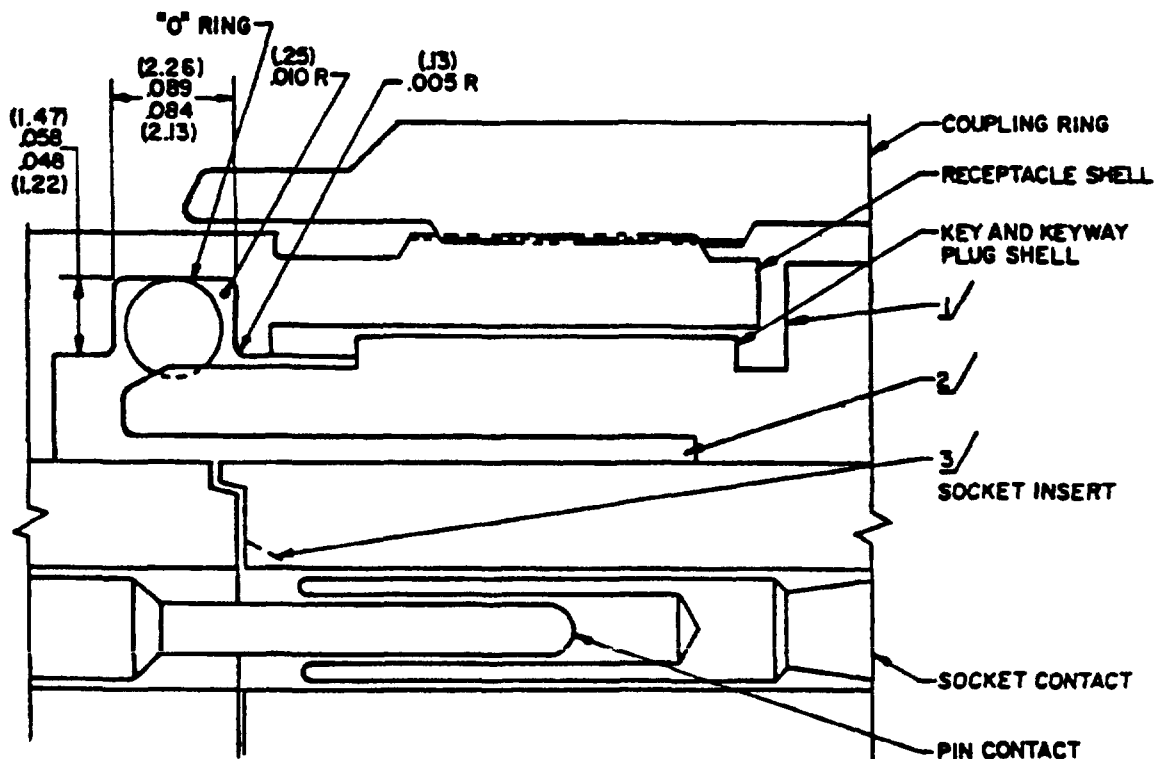
3.4.1.1.6.1 Threaded coupling. A circumferential stripe of contrasting color with the shell and a minimum of 0.025 inch in width, shall be placed on the threaded type receptacle. The dimension from the front edge of the receptacle to the far side of the stripe shall be 0.433 ± 0.015 inch. The coupling ring shall cover the stripe when the connectors are completely mated.

3.4.1.1.6.2 Bayonet coupling. Three 0.025 ± 0.010 inch wide axial stripes of contrasting color shall be placed on the bayonet coupled receptacle, the stripes shall coincide with the bayonet pin. The coupling ring shall have three similar stripes coinciding with the lock positions. The receptacle line and the coupling ring line shall align within 0.015 inch when the connectors are completely mated.

3.4.1.1.7 Screw threads. Screw threads shall be in accordance with MIL-S-7742. Out-of-roundness is not objectionable if the threads can be checked without forcing the thread gauges. All thread surfaces including the lead thread shall be smooth enough that they will not be galled, cut, or otherwise damaged by mating, or cause damage to the mating connector. All threads shall be continuous and not broken or interrupted except where otherwise required by the military standard.

3.4.1.1.8 Lubrication. Internal coupling ring threads shall be coated with a lubricant conforming to MIL-L-8937.

3.4.1.1.9 Rear connector seal. Sealing of the wires and back of the connectors shall be accomplished without aid of auxiliary compression devices.



- 1/ When inserts first meet, the shells shall lack .039 (.99) to .011 (.28) of meeting. Complete mating occurs when shells meet.
- 2/ Allow .020 (.51) minimum clearance between insert and shell to a depth of .350 (8.89) \pm .050 (1.27) back from face of insert for swelling.
- 3/ When barriers are provided on socket insert, the insert mating line above indicates top of barriers. When barriers are not used, the socket openings of the insert shall be tapered as shown by dotted lines.

FIGURE 2 Typical mating characteristics for type "T" connectors

3.4.1.2 Insert.

3.4.1.2.1 Construction. The inserts shall be designed and constructed to eliminate all air paths between contacts. The socket insert face shall be of a resilient material. An integrally molded resilient static peripheral seal shall be provided that will effect a seal before mating is completed, as shown on the military standard. The entire insert and wire sealing member shall function as an integral part. Its separate parts shall be bonded and shall provide suitable sealing around the wire shown in table I for the appropriate contact sizes. The inserts shall be designed so that positive locking of the contacts in the inserts is provided. The contact retaining device shall be free of foreign material, adhesive, or any obstruction that would prevent contact insertion and positive retention. Contacts for the hermetic receptacle shall be fused in place with vitreous material and a resilient gasket shall be cemented to the face of the insert. No metal lattice material shall be used. All materials used for inserts shall meet the requirements of 3.3.3.

TABLE I Wire sealing accommodation of contact sizes and wire dimensions.

Contact size	Range of outside diameter of all insulated conductors (Inches)	Wire gauge to which contact is required to crimp
No. 20	0.040 to 0.090	No. 24, 22, or 20
No. 16	0.068 to 0.130	No. 20, 18, or 16
No. 12	0.106 to 0.170	No. 14 or 12
Shielded	0.095 to 0.145	No. 22, 20, and 18

3.4.2 Contacts. All connectors, except the hermetic receptacles, shall be designed to meet the performance requirements of this specification, using contacts in accordance with MS24254, MS27185, MS27184, and MS24255. The contact style shall be as designated in the connector part number and the size as shown on the applicable MS insert drawing. Two spare contacts shall be provided for each size contact utilized. No spares are required for shielded contacts.

3.4.2.1 Contacts for hermetic receptacles shall be made of suitable material plated to meet the performance and detail requirements of MS27034, MS24264, and MS24265 receptacles. Dimensions shall be as shown on the applicable military standard.

3.4.2.2 Contact alignment and stability. With all contacts in place, the alignment of pin or socket contacts assembled into connectors shall be within 0.0135 inch of the true position as defined on the applicable military standard. A contact location gage shall be used to inspect for this requirement. The stability of the socket contacts shall be such that a sideplay or displacement of 0.005 inch minimum and 0.015 inch maximum will be provided when a bending moment is applied of 0.25 pound-inch force for a size 20 and a 1.00 pound-inch force for sizes 16 and 12. The bending moment shall be applied at the engaging end of the socket contact and displacement shall be measured at the extreme edges of the engagement end. This requirement shall apply to unwired contacts having sealing plugs and to contacts wired with minimum or maximum size wire

3.4.3 Plug, end seal, sealing plugs shall be in accordance with the specified part numbers in table II. At least 15 percent but not less than three spare sealing plugs shall be provided.

TABLE II Part numbers for sealing plugs.

Contact size	Part number
Size 20	MS27186-1
16	MS27187-1
12	MS27187-2
Size 22 (shielded)	MS27187-4

3.4.4 Caps. Protective plastic dust caps shall be furnished in place on each end of each plug and receptacle for protection during shipping, storage, and assembly.

3.4.5 Installation instruction sheet. Except for class H, an installation instruction sheet shall be furnished and shall specify the proper application, assembly, wiring, mounting, and installation of the specific plug or receptacle. The paper and printing shall be sulphur free. The manufacturer's name and address may appear on the instruction sheet.

3.4.6 Tools. Except for class H, contacts shall be insertable and removable from the connectors and wires shall be attachable to contacts with tools contained in tool kit, contact, crimp type electrical-connector MS27426.

3.4.7 Accessories. The accessories are not an integral part of the connector. The connector shall perform as specified when applicable accessories are used. Unless otherwise shown on the military standard, the accessories are as follows

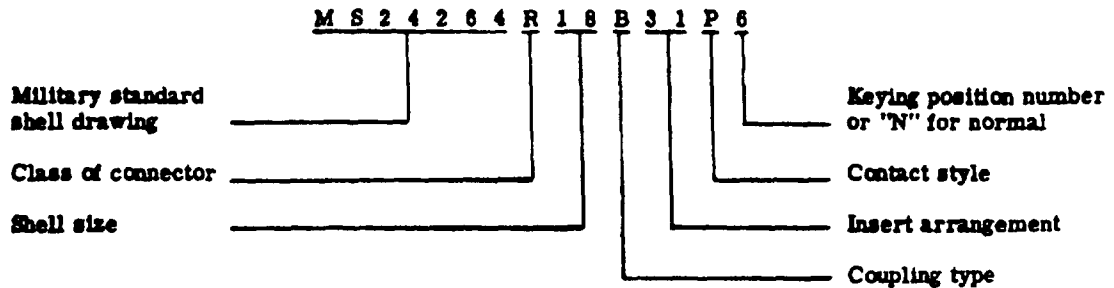
- (a) Classes R, G, and F in aluminum shell materials, cable support fitting shall be in accordance with MS27291.
- (b) Classes R, G, and F in aluminum shell materials, cable adapter bushing shall be in accordance with MS27290, used to cushion the bundle of wires in the cable support.
- (c) Classes R, G, and F in aluminum shell materials right angle conduit adapter shall be in accordance with MS27557.
- (d) Classes R, G, and F in aluminum shell materials closed right angle cable support fitting shall be in accordance with MS27558.
- (e) Classes R, G, and F in aluminum shell materials right angle cable support fitting shall be in accordance with MS27559.
- (f) A dummy stowage receptacle shall be in accordance with MS27296 or MS27297, as applicable. When the plug is coupled to its applicable dummy stowage receptacle, the mated assembly shall be sealed to prevent accumulation of dust, dirt, grease, oils, vapors, and other foreign substances on the face of the plug which could result in contamination.
- (g) A protective metal cap shall be in accordance with MS27292, MS27293, MS27294, or MS27295, as applicable. When the cap is coupled onto the receptacle or plug, the mated assembly shall prevent accumulation of dust, dirt, grease, oils, vapors, and other foreign substances on the face of the receptacle which could result in contamination.
- (h) Classes E and K in stainless steel materials, short cable support fitting shall be in accordance with MS27657.
- (i) Classes E and K in stainless steel materials, long cable support fitting shall be in accordance with MS27658.
- (j) Classes E and K in stainless steel materials, 90° cable support fitting shall be in accordance with MS27659.

3.4.8 Interchangeability. Any plug and receptacle assembly, including its complement of contacts, shall be completely interchangeable with any other plug or receptacle having the same assembly part number whether from the same or any other supplier who complies with this specification. All pin and socket contacts of the same part numbers shall be interchangeable whether from the same or any other supplier who complies with this specification.

3.4.9 Weight. The weight of plug and receptacle assemblies shall not exceed the values specified on the applicable military standards.

3.5 Marking.

3.5.1 Part numbering. The connectors shall be clearly and permanently marked. Insofar as is practical, the marking shall be readable after the connector is mounted on equipment. All letters and numbers shall be a minimum of .046825 inch in height and shall be legible after any test sequence required by this specification. Each connector shall be marked on the shell or coupling ring with the manufacturer's name or trademark and with the appropriate MS part number, as in the following example



The manufacturer's symbol for purge control shall also appear on each connector, but shall not be marked in direct association with the part number.

3.5.2 Insert arrangement. The insert arrangement shall be as specified by the connector part number and in accordance with the applicable military standards. The contact positions shall be marked by numbers and a line in accordance with the applicable MS standard. The size of the numbers shall be as large as practicable and no less than .046825 inch in height. The contact positions shall be permanently designated in contrasting color on the front and rear faces of the insert. The marking on mating faces shall be of opposite rotation so that, when mated, contacts of the same identification number shall mate with each other. The marking shall be legible on all samples after all tests.

3.6 Torque to couple/uncouple. When mated with and unmated from counterpart connectors in accordance with 4.7.2 and 4.7.2.1, the connectors shall require torque within the limits of the applicable values in table III.

TABLE III. Torque.

Shell size	Torque for types T and B (inch pounds)	
	Maximum with contacts	Minimum uncoupling without contacts type B only
8	9	2.0
10	10	2.5
12	14	3.0
14	17	3.5
16	23	4.0
18	26	5.5
20	31	6.0
22	38	6.5
24	46	7.0

3.7 Ground resistance (class G only). When tested in accordance with 4.7.3, the resistance shall not exceed 0.250 ohms.

3.8 Maintenance aging. When tested as specified in 4.7.4, the connectors shall be capable of conforming to 3.9.

3.9 Contact insertion/removal forces, except class H. When tested as specified in 4.7.5, the individual contact insertion forces shall not exceed 15 pounds. Individual removal forces shall not exceed 10 pounds.

3.10 Durability. Connector assemblies shall be tested as specified in 4.7.6. At the completion of the test, the connectors shall meet the subsequent test requirements.

3.11 Thermal shock. After testing in accordance with 4.7.7, connectors shall be unmated and show no evidence of cracking, fracture, or other damage detrimental to the connector. No material reversion shall be in evidence.

3.12 Dielectric withstanding voltage. When tested in accordance with 4.7.8, and at the voltage levels indicated by table IX, connectors shall show no evidence of flashover or breakdown. Breakdown shall be said to have occurred when leakage current exceeds 2.0 mA upon application of high potential.

3.12.1 Dielectric withstanding voltage, altitude. Completely wired and assembled connectors (mated), and also completely wired but unmated connectors shall show no evidence of breakdown or flashover when tested in accordance with 4.7.8.2. Corona shall not be considered as breakdown.

3.13 Vibration. When tested in accordance with 4.7.9, connectors shall not crack or break and there shall be no loosening of parts. Connectors shall be in full engagement during vibration and the coupling device shall not loosen as a result of vibration. Interruption of electrical continuity shall be no longer than 1 microsecond.

3.14 Shock (specified pulse). During and after testing in accordance with 4.7.10, connectors shall show no sign of damage. Interruption of electrical continuity shall not exceed 1 microsecond, when monitored by a suitable instrument.

3.15 Ozone exposure (unmated). When tested in accordance with 4.7.11, the connectors shall evidence no cracking of materials or other damage that will adversely affect subsequent performance in the qualification test sequence.

3.16 Moisture resistance. During or after the test specified in 4.7.12, the insulation resistance values shall not be less than 1,000 megohms.

3.17 Insulation resistance. When tested as specified in 4.7.13, the insulation resistance shall be greater than 5,000 megohms when measured between two adjacent contacts, and between the contact closest to the shell and the shell.

3.17.1 Insulation resistance (high temperature) When tested in accordance with 4.7.13.2, the insulation resistance of connectors shall be greater than 2,000 megohms for classes G, H, R, K, and E and 100 megohms for class F when measured separately between any two adjacent contacts, and between the shell and any contact.

3.18 Salt spray (corrosion). After testing in accordance with 4.7.14, the unmated connectors shall show no exposure of basic metal due to corrosion. Class H specimens shall be exposed unmated and shall meet the requirements of 3.26 on the first mating after corrosion testing.

3.19 Magnetic permeability, except class H. When tested in accordance with 4.7.15, the relative permeability of the connectors shall be less than level 2.0.

3.20 Temperature life. When tested in accordance with 4.7.16, the connectors shall perform satisfactorily and pass the succeeding tests in the qualification test sequence.

3.21 Insert retention. When tested in accordance with 4.7.17, connectors less cable supports or any insert supporting accessory shall withstand an axial load of 75 lb/in² from either direction for at least 5 seconds without being dislocated from their normal position in the shell.

3.21.1 Insert retention (class H). When tested in accordance with 4.7.17.1, class H connectors shall withstand a load as shown on table IV either direction parallel to the axis of the connector, for 5 seconds minimum, without displacement of contacts or insert. Connectors shall then meet requirements of 3.22.1.

TABLE IV. Insert retention loads (class H).

Shell size	Load (lb _f /in ²)
24	250
22	300
20	700
18	1000
16	1250
14	1750
12	2000
10	2750
8	3000

3.22 Air leakage. When testing in accordance with 4.7.18, receptacles shall prevent leakage of more than 1 cubic inch of air per hour.

3.22.1 Air leakage (class H receptacles). When testing in accordance with 4.7.18.1, and subjected to a pressure differential of 15 lb_f/in² across the receptacle, the receptacle shall not exhibit an air leakage rate that will produce a pressure change of more than 0.01 micron of mercury per cubic foot per hour (1×10^{-7} standard cc/sec at 1 atmosphere). The specific leakage rate shall apply through the connector only and not through the brazed or welded joint between the connector and the mounting flange.

3.23 Contact retention. When tested as specified in 4.7.19, the individual contact retention mechanism on unmated connectors shall retain the contact under the axial loads specified in table V. During the test, the axial displacement of the contact shall not exceed 0.012 inch when pressures are applied to the mating end of the contact.

TABLE V. Axial loads for contact retention
(classes R, G, F, E, and K).

Contact size	Axial loads (pounds)
20	20
16	25
12	30
#1 shielded	30
#2 shielded	45

3.24 Altitude immersion. When tested in accordance with 4.7.20, classes G, H, K, and R connectors shall maintain an insulation resistance of at least 5,000 megohms and withstand a voltage of 1,500 volts ac at sea level. Class F connectors shall maintain an insulation resistance of at least 1,000 megohms and withstand a voltage of 1,500 volts ac at sea level.

3.25 Fluid immersion (classes R, G, E, and K). After immersion in fluids specified in 4.7.21 for the times and conditions specified, unmated connectors shall mate properly

3.25.1 Fluid immersion (class F). After immersion in fluids specified and according to the cycling sequence of 4.7.21.1, unmated connectors shall mate properly. The insert shall not swell to the extent that will cause cracks or tears. Inserts shall not show evidence of material reversion

3.26 Contact resistance When testing with a mating plug and in accordance with 4.7.22, the average contact resistance value of any 10 contacts of classes H and K connectors shall not exceed those in the table I of MIL-C-26636 by more than 700 percent. No individual contact shall exceed the specified value by more than 1,100 percent at 25° and 200°C. Contacts of mated classes R, G, F, and E connectors shall meet the requirements of table I of MIL-C-26636.

3.27 Workmanship. Details or workmanship shall be in accordance with highgrade manufacturing practices for similar connectors. All sharp corners shall be broken and shall be smooth; shell surfaces shall be free from porosity, blow holes, burrs, and cracks.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-C-45662.

4.2 Classification of inspections. The inspections specified herein are classified as follows:

- (a) Qualification inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-1344.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.4.1 Qualification of additional connectors. For connectors which differ only in minor details from those submitted for qualification in 4.4, the manufacturer's test report (see 4.4.5) need only provide inspection and test data necessary to validate the differences, with information on identical features for which no inspection or test was performed.

4.4.1.1 Group qualification. Where it can be shown that a group of connectors constitutes a design series differing only in envelope dimensions, qualification of the entire series can be accomplished at the discretion of the qualifying agency by submitting the largest and smallest shell sizes to, and successfully passing, this specification. Proof of design similarity shall take into account but not necessarily be limited to the following considerations

- (a) That shell couplings are identical.
- (b) That component materials are identical.
- (c) That contacts are identical.
- (d) That contact spacing is identical, or at least that connector samples subjected to actual testing include those exhibiting the closest contact to contact and contact to shell spacing.

4.4.2 Sample size and inspection routine. Samples of each item for which qualification is desired shall be tested in the sequence specified in table VI. Each connector subjected to qualification testing shall be provided with a counterpart connector for those tests requiring mating assemblies. The counterpart connectors provided for this purpose shall be new, previously qualified connectors or new connectors submitted for qualification testing. Manufacturers not producing mating connectors shall submit data substantiating that tests were performed with approved counterpart connectors. Specific details on preparation of samples shall be as follows

4.4.2.1 Selection of samples.

4.4.2.1.1 Connector assemblies (classes R, E, and G). Two mating pairs of connectors, with insert arrangements in the densest configuration in each shell size for which qualification is desired shall be provided. Separate samples are required for each class. Manufacturers seeking qualification for less than nine shell sizes shall select a minimum of 16 mating pairs.

- (a) One sample of each shell size shall have pin contacts in the receptacle and socket contacts in the plug. The other sample shall have socket contacts in the receptacle and pin contacts in the plug.
- (b) The samples shall be divided as follows into three groups and subjected to the tests specified for their particular group in table VI, in the sequence specified.

Group I - eight mating pairs.

Group II and III - the remaining connectors shall be divided equally between the two groups.

4.4.2.1.2 Connector assemblies (class F). Three mating pairs of connectors with insert arrangements in the densest configuration in each shell size for which qualification is desired shall be provided. Manufacturers seeking qualification for less than the nine shell sizes shall select a minimum of 19 mating pairs.

- (a) One sample of each shell size shall have pin contacts in the receptacle and socket contacts in the plug. The other samples shall have socket contacts in the receptacle and pin contacts in the plug.
- (b) The samples shall be divided as follows into three groups and subjected to the tests specified for their particular group in table VI, in the sequence specified.

Group I - eight mating pairs.

Group II - four mating pairs.

Group III - seven mating pairs.

4.4.2.1.3 Connector assemblies (class H) One mating pair of connectors consisting of a class H solder mount receptacle and a qualified class R, G, or E plug shall be provided for each shell size for which qualification is desired. Each arrangement in a given shell size shall be the densest contact arrangement. Manufacturers seeking qualification for less than nine shell sizes shall select a minimum of nine mating pairs.

- (a) The samples shall be divided as follows into two groups and subjected to the tests specified for their particular group in table VI in the sequence specified.

Group IV - three mating pairs.

Group V - six mating pairs.

4.4.2.1.4 Connector assemblies (class K). Two mating pairs of panel mount receptacles and plugs with insert arrangements in the densest configuration in each shell size for which qualification is desired shall be provided. Manufacturers seeking qualification for less than the seven shell sizes shall select a minimum of 12 mating pairs.

- (a) One sample of each shell size shall have pin contacts in the receptacle and socket contacts in the plug. The other sample shall have socket contacts in the receptacle and pin contacts in the plug.
- (b) The samples shall be divided equally into three groups and subjected to the tests specified in groups I, II, and III of table VI in the sequence specified.

TABLE VI. Qualification Inspection.

Examination or test	Requirement paragraph	Method paragraph	Test groups				
			I	II	III	IV	V
Visual and mechanical examination	3.1, 3.4, 3.5 & 3.27	4.7.1	X	X	X	X	X
Torque to couple and uncouple	3.6	4.7.2	X	X		X	X
Ground resistance (class G)	3.7	4.7.3	X	X			
Maintenance aging	3.8	4.7.4	X	X			
Contact insertion/removal forces, except class H	3.9	4.7.5	X	X			
Durability	3.10	4.7.6	X				
Thermal shock	3.11	4.7.7	X	X			
Dielectric withstanding voltage (unmated)	3.12	4.7.8	X		X		
Vibration	3.13	4.7.9	X				
Shock (specified pulse)	3.14	4.7.10	X				
Ozone exposure (unmated)	3.15	4.7.11	X				
Moisture resistance	3.16	4.7.12	X				
Insulation resistance	3.17	4.7.13	X				
Salt spray (corrosion)	3.18	4.7.14	X				
Magnetic permeability, except class H	3.19	4.7.15	X	X			
Temperature life	3.20	4.7.16	X	X			
Insulation resistance (hi temp)	3.17.1	4.7.13.2	X	X		X	X
Insulation resistance	3.17	4.7.13	X	X			
Insert retention	3.21	4.7.17	X				
Insert retention (class H)	3.21.1	4.7.17.1	X				
Dielectric withstanding voltage (unmated)	3.12	4.7.8	X	X		X	X
Air leakage	3.22	4.7.18	X				
Air leakage (class H)	3.22.1	4.7.18.1	X				
Contact retention	3.23	4.7.19	X				
Altitude immersion	3.24	4.7.20	X				
Fluid immersion (classes R, G, E, and K)	3.25	4.7.21	X		X	X	X
Fluid immersion (class F)	3.25.1	4.7.21.1	X		X	X	X
Torque to couple/uncouple	3.6	4.7.2	X	X	X	X	X
Insulation resistance	3.17	4.7.13		X	X		
Dielectric withstanding voltage, altitude	3.12.1	4.7.8.2		X	X	X	X
Mated							
Unmated			X	X			X
Contact insertion/removal forces, except class H	3.9	4.7.5	X		X		
Fireproof (class K)	See applicable military standard	See applicable military standard	X				
Insulation resistance (class K)	3.26	4.7.22	X				
Dielectric withstanding voltage (mated) (class K)			X				
Contact retention fireproof (class K)			X				
Contact resistance	3.1, 3.4, 3.5 & 3.27	4.7.1	X	X	X	X	X
Visual and mechanical examination							

4.4.3 Preparation of samples.

4.4.3.1 Connector assemblies (classes R, G, F, and E). Samples shall be wired with MIL-W-18878 or MIL-W-22759 wire. Fifty percent of the samples shall be fully wired with wire approaching the minimum diameter as specified in table I. The remaining samples shall be fully wired with wire approaching the maximum diameter as specified in table I. In all test samples, 5 percent of the contacts in each connector or one contact in each connector, whichever number is greater, shall not be wired and the wire entry holes shall be filled with sealing plugs.

4.4.3.2 Connector assemblies (class H). Samples shall be wired with MIL-W-18878 or MIL-W-22759 wire. The diameter of the wire shall be within the limits specified in table I. For the altitude test, the receptacles shall be mounted as in service on sealed metal containers.

4.4.3.3 Connector assemblies (class K). Samples shall be wired with MIL-W-25038/1, MIL-W-8777(ASG), or MS25471. Fifty percent of the samples shall be fully wired with wire approaching the minimum diameter as specified in table I. The remaining samples shall be fully wired with wire approaching the maximum diameter as specified in table I.

4.4.4 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.4.5 Retention of qualification. To retain qualification, the supplier shall forward a report at 18-month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. The report shall consist of:

- (a) A summary of the results of the tests performed for inspection of product for delivery (groups A and B), indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for.
- (b) A summary of the results of tests performed for qualification verification inspection (group C), including the number and mode of failures. The summary shall include results of all qualification verification inspection tests performed and completed during the 18-month period. If the summary of the test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 30 days after the end of each 18-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time during the 18-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during 2 consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit the connector assemblies to testing in accordance with the qualification inspection requirements.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspections.

4.5.2 Inspection lot. An inspection lot shall consist of all connectors covered by a single military standard, produced under essentially the same conditions, and offered for inspection at one time. In process controls, unrelated to lot sizes of finished connectors, may be used, provided an equivalent or tighter AQL level is maintained.

4.5.2.1 Group A inspection. Hermetically sealed receptacles (class H) shall be subjected to 100 percent inspection to assure compliance with the air leakage requirements of 3.22.1.

4.5.2.2 Group B inspection. Group B inspection shall consist of the applicable tests specified in table VII and shall be made on sample units which have been subjected to and have passed the group A inspection.

TABLE VII. Group B inspection.

Test	Requirement paragraph	Test method	AQL
Visual and mechanical examination	3.1, 3.4, 3.5 & 3.27	4.7.1	1
Contact retention	3.23	4.7.19	1
Dielectric withstanding voltage	3.12	4.7.8.1	1
Insulation resistance	3.17	4.7.13.1	1

4.5.2.2.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105, level II normal inspection.

4.5.2.2.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.5.2.2.3 Disposition of sample units. Sample units which have passed the group B inspection may be delivered on the contract or purchase order.

4.6 Qualification verification inspection. Qualification verification inspection shall consist of group C. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.1.1.6), delivery of products which have passed group B shall not be delayed pending the results of these qualification verification inspections.

4.6.1 Group C inspection. Group C inspection shall consist of tests specified in table VIII, in the order shown. Group C inspection shall be made on sample units selected from inspection lots which have passed the groups A and B inspections.

4.6.1.1 Sampling plan. Within each 18 months, mated connector sample units which have passed groups A and B inspections shall be subjected to the tests specified in table VIII. Samples shall be selected in sufficient quantity to provide two samples per applicable test group.

4.6.1.1.1 Connector assemblies (classes R, G, F, and E). Four mating pairs of connectors with insert arrangements in the densest configuration in shell sizes representative of production during the preceding 18-month period, shall be provided. Two samples shall have pin contacts in the plug and socket contacts in the receptacle and shall be wired with wire approaching the minimum specified in table I. The remaining samples shall have socket contacts in the plug and pin contacts in the receptacle and shall be wired with wire approaching the maximum diameter specified in table I. Fifty percent of the samples with pin contacts in the plug and 50 percent of the samples with socket contacts in the plug shall be subjected to the tests in group I of table VIII. The balance of the samples shall be subjected to the tests in group II of table VIII for class F at least seven mating pairs shall be used for group I.

4.6.1.1.2 Connector assemblies (class H). Four mating pairs of connectors consisting of a class H solder mount receptacle and a qualified class R, G, or E plug with insert arrangements in the densest configuration in shell sizes representative of production during the preceding 18-month period shall be provided. Two samples shall be wired with wire of nominal gage for which the contacts are designed and subjected to the tests in group III of table VIII. The balance of the samples shall have the full complement of contacts installed in the plug but need not be wired and shall be subjected to the tests in group IV of table VIII.

TABLE VIII. Group C inspection.

Test	Requirement paragraph	Method paragraph	Test group						
			I	II	III	IV	V	VI	VII
Maintenance aging	3.8	4.7.4	X	X	X	X	X	X	
Durability	3.10	4.7.6	X		X		X		
Thermal shock	3.11	4.7.7	X		X		X		
Vibration	3.13	4.7.9	X		X		X		
Shock, specified pulse	3.14	4.7.10	X		X		X		
Moisture resistance	3.16	4.7.12	X		X		X		
Insulation resistance	3.17	4.7.13	X		X		X		
Temperature life	3.20	4.7.16		X		X		X	
Insulation resistance (hi temp)	3.17.1	4.7.13.2		X		X		X	
Insert retention	3.21	4.7.17	X		X		X		
Altitude immersion	3.24	4.7.20	X		X		X		
Fluid immersion (class F)	3.25.1	4.7.21.1	X						
Torque to couple/uncouple	3.6	4.7.2	X	X	X	X	X	X	
Fireproof	See applicable military standard	See applicable military standard							X
Insulation resistance (fireproof)									X
Contact retention (fireproof)									X

4.6.1.1.3 Connector assemblies (class K). Six mating pairs of connectors with insert arrangements in the densest configuration in shell sizes representative of production during the preceding 18-month period shall be provided. Three samples shall have pin contacts in the plug and socket contacts in the receptacle and shall be wired with wire approaching the minimum diameter specified in table I. The remaining samples shall have socket contacts in the plug and pin contacts in the receptacle and shall be wired with wire approaching the maximum diameter specified in table I. One pair each shall be subjected to tests specified in groups V, VI, and VII of table VIII. A pair shall be defined as one sample with pin contacts in the plug and socket contacts in the receptacle, and one sample with socket contacts in the plug and pin contacts in the receptacle.

4.6.1.1.4 Failures. If one or more sample units fail to pass group C inspection, the sample shall be considered to have failed.

4.6.1.1.5 Disposition of sample units. Sample units which have been subjected to group C inspection shall not be delivered on the contract or purchase order.

4.6.1.1.6 Noncompliance. If a sample fails to pass group C inspection, the supplier shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured with essentially the same materials, processes, etc., and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the Government). Groups A and B inspections may be reinstituted, however, final acceptance shall be withheld until the group C reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.6.2 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation - packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

4.7 Methods of examination and test

4.7.1 Visual and mechanical examination. Connectors shall be examined to verify that the materials, design, construction, marking and workmanship are in accordance with the applicable requirements (see 3.1, 3.4, 3.5, and 3.27)

4.7.2 Torque to couple/uncouple (see 3.6). While applying a coupling or an uncoupling force to the coupling ring at a uniform rate of approximately 4 inch-pound per second, the torque required to mate and unmate the plug from its counterpart shall be measured and recorded.

4.7.2.1 Torque to couple/uncouple (no contacts) (see 3.6). With no contacts in the connectors, measurements shall be made in accordance with 4.7.2.

4.7.3 Ground resistance (class G only) (see 3.7). Connectors shall be mounted by its normal mounting means to a copper plate of 1/4-inch minimum thickness. With a plug properly mated to the receptacle, a resistance measurement shall be made from a cable clamp screw on the plug to the copper plate, using a milliohmmeter of the four-terminal type.

4.7.4 Maintenance aging (see 3.8). Prior to environmental tests, each contact shall be inserted, removed, and reinserted using applicable insertion and removal tools. The same contacts shall be used throughout this aging and subsequent tests. The connector shall be mated and unmated 10 times. Twenty percent of the contacts, but not less than three contacts in both plugs and receptacles, shall be removed and inserted nine times using applicable insertion and removal tools. Pairs of adjacent contacts and contacts adjacent to the shell shall be cycled, with the total number of contacts cycled. This test shall provide accelerated maintenance aging of the contact, contact locking mechanism, and sealing provisions prior to environmental testing.

4.7.5 Contact insertion/removal forces, except class H (see 3.9). The forces required to push the wired contacts into their normal position within the insert and to remove them, using the applicable insertion or removal tool, shall be measured. Unless otherwise specified, 20 percent but not less than three contacts in both plugs and receptacles shall be measured. Measurements shall be taken on one contact at a time with all other contact holes filled with wired contacts or contacts followed by sealing plugs.

4.7.6 Durability (see 3.10). The connector assemblies shall be subjected to 200 cycles of mating and unmating for type T and 500 cycles for type B. The mating and unmating shall be accomplished in a manner similar to subjection in service.

4.7.7 Thermal shock (see 3.11). The wired, mated connectors shall be subjected to five continuous cycles of temperature change. The two temperature extremes shall form the limits of the cycle which shall be $-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and $+260^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for classes R, H, G, K, and E and $+200^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for class F. The first exposure shall be from room temperature to the lowest extreme. The connectors shall be maintained at each extreme for 30 ± 5 minutes in each cycle. The connectors shall be transferred from one chamber to the other for the temperature changes. The time of exposure at room temperature shall not exceed 2 minutes during each transfer. Exposure to low temperature and then high temperature shall form one cycle. Upon completion of the last cycle, the connectors shall be returned to room ambient conditions for inspection.

4.7.8 Dielectric withstanding voltage (see 3.12). Unmated connectors shall be tested in accordance with MIL-STD-1344, method 3001. Test voltages, as shown in table IX shall be applied between the closest three pair of adjacent contacts that were subjected to maintenance aging and between the shell, and the three contacts closest to the shell that were subjected to maintenance aging (see 4.7.4). Mated connectors (class K) shall be in accordance with applicable military standards.

4.7.8.1 Dielectric withstanding voltage (group B). Unmated connectors shall be tested in accordance with MIL-STD-1344, method 3001. Test voltages, as shown in table IX shall be applied between all adjacent contacts and between the shell and each contact closest to the shell. Simulated contacts may be used and the minimum voltage time shall be 5 seconds.

TABLE IX. Test voltages (ac-rms).

Altitude (feet)	Unmated		Mated
	Style S	Style P	
Sea level	1500	1500	1500
10,000	1250	1250	1250
30,000	750	700	1000
50,000	500	450	1000
70,000	350	275	1000
90,000	250	200	1000
110,000	250	200	1000

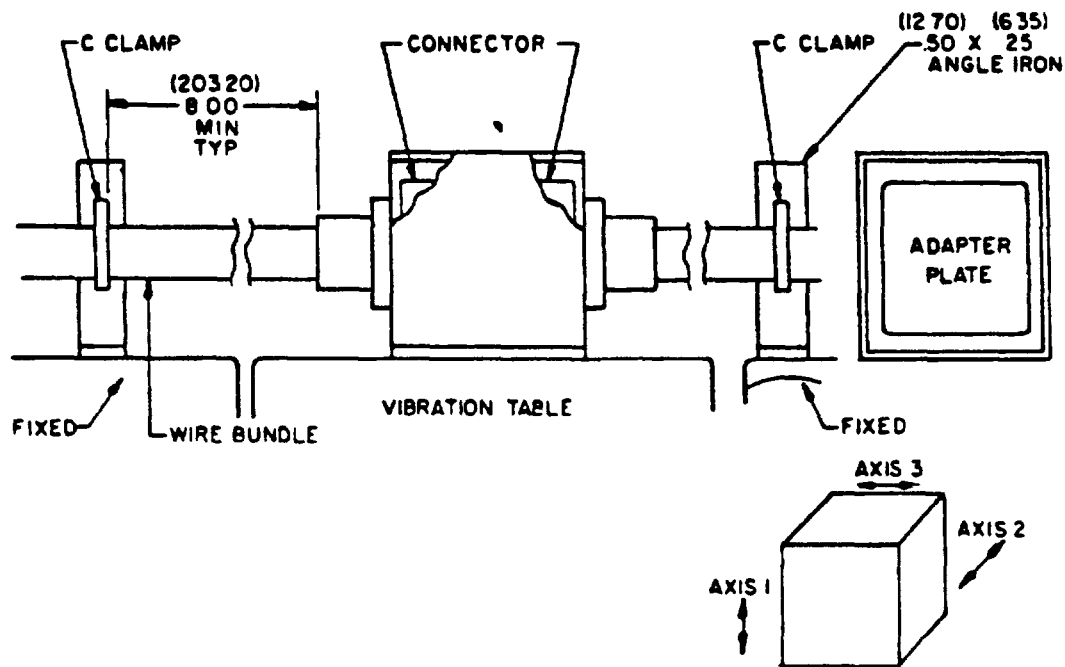
4.7.8.2 Dielectric withstanding voltage, altitude (unmated and mated) (see 3.12.1). The connectors shall be placed in a suitable chamber at room temperature and tested at 20,000-foot intervals, starting at 10,000 feet and concluding at 110,000 feet. The tests for both mated and unmated connectors shall be in accordance with MIL-STD-1344, method 3001. Test voltages, as shown in table IX, shall be applied between the closest three pairs of contacts as well as between the shell and the three contacts closest to the shell. Exposed wire ends in the chamber shall be widely separated or sealed to reduce corona.

4.7.9 Vibration (see 3.13). The connector assembly shall be mounted as specified in 4.7.9.1 and vibrated in accordance with MIL-STD-1344, method 2005, test condition IV. In addition, the vibration shall be conducted at a low temperature ambient of -55°C and high ambient of 200°C for classes R, H, G, K, and E, and 175°C for class F. All contacts shall be wired in series, with at least 100 milliamperes of current allowed to flow. A suitable instrument shall be used to monitor the current flow and indicate any discontinuity of contact or interruption of current flow exceeding 1 microsecond. Duration of vibration at extreme temperatures shall be 25 percent of the duration specified for the standard temperature condition.

4.7.9.1 Connector mounting. The vibration mounting shall be in accordance with figure 3. The receptacle shall be mounted on an adapter plate using the connector's normal mounting provisions and suitable hardware. The adapter plate for the receptacle shall be attached to the mounting bracket. The plug shall be mated with the receptacle as in service. No safety wire or supplementary locking device shall be used.

4.7.10 Shock (specified pulse) (see 3.14). The wired and mated connectors shall be subjected to a transient deceleration force as specified in MIL-STD-1344, method 2004. The forces shall be produced by securing the connectors to a sufficient mass and dropping the assembly through such a height that when decelerated by resilient impact, a force of 100 gravity units is obtained as outlined in MIL-STD-202, method 213, test condition C. At least one blow shall be applied in each major axis of the connector so that the resultant force tends to disengage the connectors. Receptacles shall be mounted by a method similar to the vibration test on the shock device or carriage. Plugs shall be engaged with the receptacles. The connectors shall be wired in series with at least 100 milliamperes allowed to flow. The wire bundle or cable shall be clamped to points that move with the connector. A minimum of 8 inches of wire or cable shall be unsupported behind each connector.

4.7.11 Ozone exposure (unmated, see 3.15) The unmated connectors shall be subjected to ozone having a concentration from 0.010 to 0.015 percent by volume for 2 hours at room temperature. Following the test, samples shall be examined for signs of ozone deterioration.



NOTES

1. Dimensions are in inches.
2. Metric equivalents are in parentheses.
3. Unless otherwise specified, tolerance is $\pm .02$ (.51).
4. Mounting bracket 25 (6.35) steel construction

FIGURE 3 Vibration testing equipment

4.7.12 Moisture resistance (see 3.16). The mated and wired connectors shall be subjected to a moisture resistance test in accordance with MIL-STD-1344, method 1002, type II, with the following exceptions and details:

- (a) Test condition letter - Type II, omitting subcycles step 7b.
- (b) There shall be no drip loops in the wires.
- (c) Wires shall be brought out of the chamber through vaportight seals.
- (d) There shall be no wire splices in the chamber.
- (e) Upon completion of step 6 of the final cycle, while the connectors are still subjected to high humidity, the insulation resistance shall be measured.
- (f) The class H receptacles shall not be enclosed for this test, but shall be blown dry before the insulation resistance measurements.

4.7.13 Insulation resistance (see 3.17). The connectors shall be tested in accordance with MIL-STD-1344, method 3003. For test purposes, the resistance shall be measured separately between the closest three pairs of adjacent contacts, which were inserted and removed 10 times in maintenance aging and between the contact closest to the shell and the shell.

4.7.13.1 Insulation resistance (group B). Connectors shall be tested in accordance with MIL-STD-1344, method 3003. For group B inspection the test potential may be applied through simulated contacts. The resistance shall be measured separately between the closest three pairs of adjacent contacts and between the contacts closest to the shell and the shell. Maintenance aging is not required for group B inspection.

4.7.13.2 Insulation resistance (high temperature) (see 3.17.1). The insulation resistance of mated connectors shall be measured in accordance with 4.7.13 except the connectors shall have been exposed to an ambient temperature of $200^{\circ} +3^{\circ}_{-0^{\circ}}\text{C}$ for classes R, H, G, K, and E, and $175^{\circ} +3^{\circ}_{-0^{\circ}}\text{C}$ for class F for 30 minutes, the resistance shall be measured while the connector is at the elevated temperature.

4.7.14 Salt spray (corrosion) (see 3.18). Wired connectors shall be subjected to a salt spray test in accordance with MIL-STD-1344, method 1001, test condition B. Following the test, connectors shall be examined for corrosion. Class H specimens shall be tested in accordance with 4.7.22.

4.7.15 Magnetic permeability (except class H, see 3.19). Permeability shall be checked with an instrument conforming to MIL-I-17214. The connectors may be wired or unwired, as convenient, but shall not be carrying current.

4.7.16 Temperature life (see 3.20). The mated connectors shall be subjected to an ambient temperature of $200^{\circ} +3^{\circ}_{-0^{\circ}}\text{C}$ for classes R, H, G, K, and E, and $175^{\circ} +3^{\circ}_{-0^{\circ}}\text{C}$ for class F, as monitored adjacent to connector shells, for 1,000 hours. The wired contacts shall carry sufficient current, not exceeding the rated current to maintain a contact temperature of $238^{\circ} +3^{\circ}_{-0^{\circ}}\text{C}$ for classes R, H, G, K, and E, and $200^{\circ} +3^{\circ}_{-0^{\circ}}\text{C}$ for class F. The temperature shall be monitored on a contact closest to the center of the connectors.

4.7.17 Insert retention (see 3.21). Unmated connectors shall be subjected to axial loads applied separately to insert face and insert rear. The loading shall be increased gradually at an approximate rate of 10 pound per second until the specified load is reached. The load shall be maintained for 5 seconds. The load-applying device may be shaped as necessary to reduce the pressure at individual points.

4.7.17.1 Insert retention (class H) (see 3.21.1) Test specimens shall be mounted in a fixture which simulates mounting in actual service. Such fixture shall accommodate an adapter suitable for connection to a pressure source (air or hydraulic). Pressure shall be gradually applied at a rate such that the specified pressure is uniformly arrived at in a time not to exceed 2 minutes. Pressure shall be maintained for the specified time. Following the test, air leakage shall be performed as specified in 4.7.18.1.

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4.7.18 Air leakage (see 3.22). Wired receptacles shall be mounted in a test apparatus, arranged to permit application of a 30 lb_f/in² pressure differential across the receptacle. The test shall be performed in both directions separately after 30 minutes of exposure to a temperature of -55°C, and while samples are at the low temperature. The exposed ends of the wires shall not be sealed during the measurement of air leakage; leakage through the unsealed wire insulation shall be included in the air leakage measurements. Means shall be provided to determine leakage of air through the connector.

4.7.18.1 Air leakage, class H (see 3.22.1). Receptacles shall be mounted in a test apparatus arranged to permit application of 15 lb_f/in² pressure differential across the connector. Prior to test, at least 10 percent with a minimum of three of the contacts shall have short wires soldered into normal service positions. The leakage rate shall be determined while 15 lb_f/in² pressurized air or gas, containing not less than 10 percent helium by volume, is applied to the connector.

4.7.19 Contact retention (see 3.23). An axial load, as shown in table V, shall be applied to the mating end of the contacts in unmated connectors. The test procedure shall be as specified in MIL-STD-1344, method 2007. Contact movement shall be measured after contact is firmly seated on the retention member. The connector shall have all the contacts in place during the test.

4.7.19.1 Contact retention (group B). Each contact retention mechanism in the connector shall be subjected to an axial load as shown in table V. The test shall be as specified in MIL-STD-1344, method 2007. Simulated contacts may be used. Failure of the retention mechanism to retain the contact or simulated contact in its normal position shall be cause for rejection.

4.7.20 Altitude immersion (see 3.24). Mated connectors shall be immersed in a container of water at approximately 20°C and placed in a chamber. Wire ends opposite the connector, shall be terminated within the altitude chamber, exposed to the chamber atmosphere but not submerged. The exposed wire ends shall not be sealed. Five percent salt by weight, shall be added to make the water conductive. The chamber pressure shall be reduced to approximately 1 inch of mercury and maintained for 30 minutes. The chamber pressure shall then be returned to atmospheric pressure in not more than 1 minute. While the connectors are still submerged, insulation resistance (see 4.7.13), measurements shall be made. This shall constitute one cycle. Two additional environmental cycles shall be run. At the end of the third cycle, the insulation resistance measurements made at the end of the first cycle shall be repeated. A dielectric withstanding test voltage (see 4.7.8) shall be applied between the same points as those used for insulation resistance measurements. The voltage shall be applied while the connectors are still submerged and at atmospheric pressure.

TABLE X. Fluid immersion.

Sample subgroup	Test fluid specification	Test procedure
1	MIL-L-7808	Immerse unmated connectors in fluid at 120° ±3°C for 5 minutes.
2	MIL-L-23699	Remove connectors and allow to drain for 1 hour at room temperature. Fluid shall be drained from all recesses. Mate connectors and expose to 175° ±3°C in air circulating oven for 22 hours. Repeat procedure for a total of seven cycles.
3	MIL-H-5606	Same as above except immerse in fluid at 85°C for 5 minutes and expose mated connectors to 104° ±3°C in an air circulating oven for 22 hours
4	MIL-T-5624 (Grade JP-5)	Same as for MIL-L-7808 except fluid temperature shall be at room temperature.
5	Glycol	Same as MIL-L-7808 except fluid temperature shall be 65° ±3°C and connectors shall be mated during fluid immersion.
6	Alkaline cleaning solution pH10-12	
7	MIL-H-5606	The unmated connectors shall be immersed in the fluid at room temperature for 20 hours. Remove connectors and allow to drain for 1 hour at room temperature. Fluid shall be drained from all recesses

4.7.21 Fluid immersion (classes R, G, E, and K) (see 3.25). The unmated connectors shall be immersed in the following fluids for the time indicated

- (a) Half of the samples in petroleum base hydraulic fluid conforming to MIL-H-5606 for 20 hours.
- (b) Half of the samples in aviation lubricating oil, conforming to MIL-L-27502, for 20 hours.

Upon removal from the fluid, the connectors shall be placed in a position to allow the fluid to drain from the mating insert face and remain in free air at room temperature for 1 hour. The connectors shall then be mated by hand.

4.7.21.1 Fluid immersion (class F) (see 3.25 1). Connectors in group IV of table VI shall be divided equally into seven subgroups and tested as shown in table X. Each subgroup shall contain connectors wired with the smallest and largest insulation diameter wires as described in 4.4.2. After testing in accordance with table X, the connectors shall be visually (no magnification) inspected for cracks or tears and mated by hand.

4.7.22 Contact resistance (see 3.26).^a Contacts of mated connectors shall be tested in accordance with table I of MIL-C-26636.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging shall be in accordance with MIL-C-55330.

6. NOTES

6.1 Intended use. The connectors covered by this specification are intended for use in electrical control and power circuits of ground, rocket, missile, aircraft and space environments.

6.2 Ordering data. Procurement documents should specify the following

- (a) Title, number, and date of this specification.
- (b) The part number in accordance with the applicable military standards.
- (c) Accessories
- (d) Levels of preservation, packaging, packing, and applicable marking.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the applicable qualified products list whether or not such products have actually been listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Rome Air Development Center, Griffiss AFB, NY 13440, however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-E), Dayton, Ohio 45444. Applications for qualification tests will be made in accordance with "Provisions Governing Qualification" (see 6.3.1).

6.3.1 Copies of Provisions Governing Qualification may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

6.4 Changes from previous issue Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes

MIL-C-26500E(USAF)

Review activity:
Air Force - 11, 80

Preparing activity:
Air Force - 17

Agent:
DSA - ES

(Project 5935-F765)

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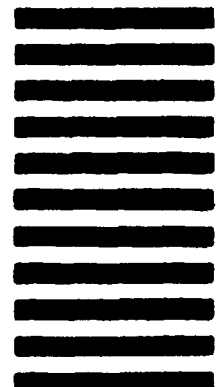


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